V. *Some observations on the Reproduction of the* Hemiptera-Cryptocerata. By C. Gordon Hewitt, B. Sc., The University, Manchester. Communicated by Prof. E. B. Poulton, D.Sc., M.A., F.R.S.

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During a short visit to the Sutton Broad Fresh-water Laboratory in the Easter Vacation of 1905, I was able to make a few observations on some points in the reproduction of three families of this subdivision of the *Hemiptera*. The *Hemiptera-Cryptocerata* form the second series of the *Hemiptera-Heteroptera*, and are interesting on account of their aquatic habits. The species studied belong to the families *Nepidæ*, *Corixidæ*, *Naucoridæ*.

As I am unaware of any account of the copulation of *Nepa cinerea*, and as this process is interesting in this form, I shall describe it in detail.

Nepa cinerea.

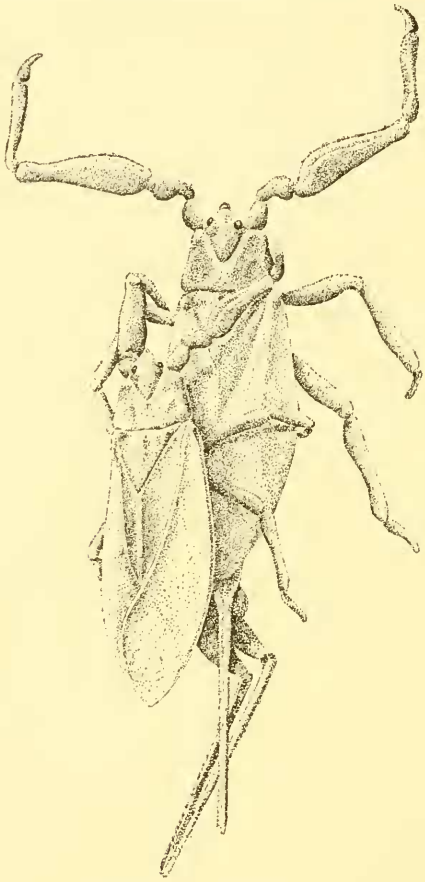
This insect, the common water-scorpion, was fairly common in the dykes near the laboratory, and wishing to obtain eggs at different stages of development, I placed a number of males and females in an aquarium.

Whether it was on account of the sexes being brought into close proximity I don't know, but it was not long before the males discovered the presence of the females.

There are no preliminary amorous passages in the courtship of *Nepa*. This may possibly be accounted for by several facts. The antennæ, which play such an important part in the courtship of those insects whose habits at this stage have been studied are too short to be of use in these operations, so that we do not find any "caressing of antennæ." Nor do they appear to be of use for perceiving the presence of the female, as far as can be observed.

The movements of the male *Nepa* are in accordance with its usual habits. On perceiving a female, whether it is by sight or by some sense of smell I cannot say, he advances till he is within a short distance and then with

a slight dart he seizes her, and crawls in an awkward manner on to her back. The female generally struggles to rid herself of the male at first, but if the male has made sure of his hold, she gives in. The male usually



Copulation of *Nepa cinerea*.

approaches the female from behind or from the side, but he often advances *vis-à-vis*, and then, having made firm his hold on the back of the female, he very carefully turns round till both face the same direction; it is during this manœuvre that the female often manages to get rid of the male.

One of the chief peculiarities of the *Nepidæ* is that they are provided with a siphon at the posterior end of the body. This is composed of two setæ arising from the dorsal side of the apex of the abdomen and having their inner grooved surfaces, which are provided with a double row of setæ forming a trough-like channel, closely adpressed, so that a perfect tube is formed, the distal end of which communicates with the air, and the proximal end with the single pair of large stigmata.

The chief interest in the copulatory process of *Nepa* lies in the method of disposition of these setæ, so that the male and female genital organs may be *in coitu*, and at the same time both individuals may receive a supply of air for respiratory purposes.

The male bends down the end of its abdomen underneath that of the female so that the coitus can take place. This awkward position causes the proximal ends of the setæ forming the respiratory siphon to separate somewhat, but they are brought in as close juxtaposition as possible; the distal end communicates with the air as in the female, the siphons of both male and female are in close proximity. In the individuals observed, copulation took place in the evening and lasted till the following day.

It was interesting to note that the female during copulation did not seem to mind the presence of the male in the least, and continued feeding. Prof. Poulton observed the same phenomenon in *Pezotettix pedestris*.*

Corixa.

Several species were placed in an aquarium in order to obtain their eggs. Copulation takes place by the male clinging to the back of the female by means of the first two pairs of legs; the female swims about with the male in this position, and copulation lasts several hours.

The female begins to deposit her eggs the following day. The species under observation were provided with growing plants of *Hottonia*, and they deposited their eggs on these singly, in all positions, a short time elapsing the deposition of each egg, sometimes as much as an hour, but of course they were not under entirely natural conditions. In depositing an egg, the female grasps the leaflet or portion of the plant selected with the first two pairs of legs and then

* Trans. Ent. Soc. Lond., 1896, p. 237.

a longitudinal motion of the abdomen is observed, the tip resting on the spot where the egg will be deposited. During this movement the minute drop of fluid which affixes the egg to the plant is emitted, and placed in the desired position, the egg is then laid with the micropyle farthest away from the point of attachment and the female swims away.

Several days may be occupied by a single female in depositing her batch of eggs, the number of eggs deposited daily decreasing.

The habits of *Naucoris* are similar to those of *Corixa*, and need not be described.

The general conclusion arrived at as a result of these observations is that there does not appear to be any sexual selection in the *Hemiptera-Cryptocerata*.